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Dated

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THE PATENT OFFICE

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## Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

11/77

26SEP03 E840352-1 D02986  
P01/7700 0.00-0322606.5

The Patent Office

 Cardiff Road  
 Newport  
 South Wales  
 NP10 8QQ

1. Your reference

358-11 GB

2. Patent application number

(The Patent Office will fill in this part)

26 SEP 2003

0322606.5

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Global Cynergy Solutions Ltd

Patents ADP number (if you know it) 08722365001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

 Anthony Asquith  
 328 Leeds Rd  
 Shales  
 Leeds  
 LS15 4DD

Patents ADP number (if you know it)

02657096003

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)
 8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:  
 a) any applicant named in part 3 is not an inventor, or  
 b) there is an inventor who is not named as an applicant, or  
 c) any named applicant is a corporate body.  
 See note (d))

**Patents Form 1/77**

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Continuation sheets of this form

Description 8

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Claim(s)

Abstract

Drawing(s) 5 only

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination  
(*Patents Form 10/77*)

Any other documents  
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

12. Name and daytime telephone number of person to contact in the United Kingdom

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- e) Once you have filled in the form you must remember to sign and date it.
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This document outlines the technical improvements and innovations that have been developed to improve and expand the process of removing moisture from within thermal windows as outlined in Canadian Patent 1332541.

## Summary

Canadian Patent 1332541 is for a filter/valve which does not have the capability of positively sealing against re-entry of air and moisture into the window cavity. It does not have process defined to positively dry the cavity and the imbedded desiccant. In environments without extended periods of direct sunlight it may fail to give satisfactory results, or the results may be slow to achieve. In addition the illustrated valve projects above the exterior surface of the glazing with risk of damage during normal usage or from vandalism. The methods discussed do not assure accurate placement, sizing, or quality of the required entry holes; therefore introducing potential sources of stress failure for the glazing.

In summary the GlobalCynergy solution is a comprehensive end-to-end process utilizing specialized tooling to assure perfectly sized and accurately placed holes in the Glazing. This solution details the processes and tooling necessary to evacuate the contaminated air and all surface and water vapor within the cavity minimizing reliance on thermal pumping for initial clearing of the vapor fogging. The solution incorporates processes and tooling to use "super-dry" air with equipment which has proven capabilities within industry and the medical and laboratory fields. Furthermore the use of a proprietary one-way valve provides improved integrity against re-entry of moisture laden air from the atmosphere. The solution gains further integrity from the solar pumping capabilities used in the Canadian Patent but does not rely on it for initial customer satisfaction; in fact these capabilities are enhanced through use of the industrial/medical quality valve thus providing superior protection against re-entry of moisture over the slit plastic product or fine mesh filter outlined in the Canadian Patent..

## Background

Thermal-pane or insulated sash windows have been broadly accepted in the residential and commercial building trade for over 50 years. Also known as multi-glazing, double or triple pane, and various other trade names, these glazing materials gain their insulating effectiveness by trapping a layer of dry gas or air between two or more pieces of glass. The resulting sandwich of glass and dry air provide an effective barrier against heat transition between interior and exterior environments. This resistance to the flow of thermal energy has been scientifically proven to be effective in reducing heating and air conditioning expenses the world over.

In layman's terms the effectiveness of this thermal sandwich exists because trapped air or gas is an insulator. Water, in liquid or gaseous forms, unlike air allows the transfer of thermal energy, hence a key to the effectiveness of Thermal-pane windows is the retention of the dry air or gas to maintain the insulating properties. Once the seal between these sandwiches of glass and air are ruptured the effectiveness of Thermal-pane windows is dramatically reduced by the introduction of water in either liquid or gaseous form. The failure of these seals has plagued manufacturers of insulating glass products since their inception.

The introduction of moisture between the two (or more) layers of glass in Thermal-pane windows introduces additional and potentially more annoying problems to consumers; this problem is the fogging or cloudiness which develops as the moisture vaporizes and condenses on the interior surfaces of the glass sandwich. If unchecked this trapped moisture can cause permanent damage to the glass surfaces by leeching minerals out of the glass and depositing them on the interior surfaces; this further clouds or obstructs vision through the sash.

Thermal-pane sash replacement has been the only method of repair to date; a significant portion of new glass production is used each year to replace failed windows. This represents an extremely expensive, time consuming, and environmentally unfriendly approach to the problem. This problem is compounded for the consumer as the replacement products require additional labor in the form of priming, painting, and potentially re-installation of security devices where present.

## Improvements to Existing Process

GlobalCynergy Solutions has developed improvements in a number of key areas, affecting all aspects of the process. The process steps are defined below:

### *Accessing the Enclosed Volume within the Window*

- When drilling through the glass in order to access the interior of the window, we utilize a vacuum fixture to precisely position a drill onto the glass surface, as in figure 1. The drill employs a liquid cooled solid or hollow diamond drill to pierce one or more of the panes of glass. The drill used for this purpose is industrial quality and portable, enabling the process to be performed at the residence or commercial establishment. The drilling fixture employs a precision depth stop to assure accuracy. The drilling fixture also employs a coolant delivery and recovery mechanism to ensure that the drill bit is adequately cooled and that the used coolant is recovered.
- When drilling through the frame in order to access the interior of the window, we utilize a self-centering jig installed on the door frame thus positioning a portable drill to penetrate the wood frame holding the window. One or more entrance holes will be made with a special "brad-point" drill bit along with a precise depth stop. The entrance hole will stop at the exact entry point of the metal spacer, which separates the two glass panes. A custom drill bushing will be inserted into the entrance hole and a drill bit which fits inside this "bushing" or "drill guide" will bore a hole through the spacer bar. In certain cases, it will also be required to drill an intersecting hole from either the inside or outside of the window unit to allow the venting of the window interior.

### ***Cleaning the Interior of the Window***

- After the interior of the window has been accessed, a solution consisting of CrystalClear 550 (or similar acid-based cleaner) diluted with distilled water is sprayed into the cavity between the two layers of glass. The solution strength is varied in direct relationship with the severity of deposits and scaling on the interior surface(s) of the glass cavity. This solution is allowed to remain for a measured period of time to dissolve the deposits. At this point, the "*intra-pane squeegee*" (see tools section) could be employed to further clean the interior of the glass. The solution is then drained from the cavity into a recovery container for reuse; a vacuum fixture is employed to expedite this process and assure recovery of all fluids. The resulting glass surfaces are examined and if necessary the dilution level of the cleaning solution is adjusted and the cleaning process is repeated. Once the glass surfaces have been cleaned satisfactorily, the window interior is flushed with distilled water.

### ***Drying the Interior of the Window***

- After the water is drained from the cavity with a vacuum fixture the window is flushed with IPA (Isopropyl Alcohol) or another alcohol based solution that combines readily with water to facilitate the evaporation of the water remaining in the window. This contaminated IPA solution is also captured for potential reuse with the vacuum fixture. Once the IPA solution has been captured, the "*Window Dryer*" (see tools section) is attached to the window to further remove moisture remaining within the window as well as from the desiccant within the spacer bars.

### ***Sealing the Interior of the Window***

- Once the desired relative humidity levels are achieved the "*Window Dryer*" is removed from the glass cavity and a clear silicon plug is inserted with industrial sealant to permanently seal one or more holes. A special "one-way valve" plug (see tools section) is inserted into one or more of the other holes.
- In the case where the holes into the widow space were made through the window frame, those access holes that will not contain a "one-way valve", are plugged using a wooden (or other material) plug, sealed with silicon to ensure a leak-free seal. For those access holes that will contain a "one-way valve", a bushing and sealant is inserted into the hole; the bushing has been manufactured to precise tolerances to allow the "one-way valve" to be utilized in this cavity. It may be necessary to drill another hole into the frame that intersects the initial hole at 90 degrees in order to vent the "one-way valve" to either the interior or exterior of the window.

## Tools

GlobalCynergy Solutions has developed a number of new tools specific to the application of either the existing process or the improved process outlined above.

### *Drilling Jig*

- The drilling jig is a guide mounted on the frame of the window or patio door to be processed that simplifies the alignment and depth of the holes that are required to be drilled into the window.

### *Intra-Pane Squeegee*

- The intra-pane squeegee is a flexible metal metallic chain covered in a cloth cleaning surface. It is sufficiently flexible to be able to be inserted into the space between the window panes, yet when a magnetic field of sufficient strength is applied to either side of the exterior of the window, the squeegee becomes rigid and is able to be manipulated within the window space by a magnet applied to the exterior of the window. Once the interior of the window has been cleaned by the intra-pane squeegee, the magnetic field is removed and the intra-pane squeegee returns to it's original flexible state in order to be removed from the window space.

## **Window Dryer**

- The window dryer removes moisture trapped within the window cavity by creating a closed loop air flow as follows:
  - Super dry air is created by passing compressed air through the mini-dryer; it passes through a pressure regulated valve (and optionally a humidity monitoring device) into the window cavity through one of the access holes
  - Moisture-laden air is expelled through a different access hole and may be passed through a humidity monitoring device to track the performance of the drying process. The moisture-laden air is exhausted into the atmosphere.
  - This process is continued until the ambient humidity level within the glass cavity reaches the desired relative humidity level

## One-Way Valve

- The one-way valve will be a plug assembly made of silicon (or another material) that incorporates a low-leak or zero-leak check valve (using either a duckbill, umbrella or other commercial check valve design) to prevent air from entering into the plug, while having a low cracking pressure to allow air to pass out of the plug under very low pressure. Either end of the plug will be covered by a screen or mesh to minimize the entry of particles (such as air pollution) or insects. The function of the one-way valve is to allow air and ambient moisture vapor to escape outward from the interior of the window while preventing backflow or re-entry of humidity laden outside air. These plugs will be anchored into one or more of the access holes that have been drilled to provide access into the window cavity.

## GlobalCynergy Precision Drill Guide and Template for Doors

### Brief description of the Guide/Template

#### Purpose:

To guarantee accuracy and insure safety for the operator and consumer when drilling hinged or sliding patio or exterior doors containing "tempered", "hardened", or "shatter-resistant" glass.

These types of glass (noted herein) cannot be drilled directly as they will crumble or shatter as designed. The entrance hole(s) for cleaning, drying, and venting via a one way filter must be inserted into a cavity penetrating the edge of the glass sandwich; specifically the hole must be accurately placed in the metal or composition spacer between the two pieces of glass.

The attached line drawing illustrates the design of our Drill Guide/Template.

#### Application:

In use the Precision Guide/Template is positioned directly onto standard 2 & 3/8 inch doors by sliding it into position at the top or bottom of the door frame. Once in position it is clamped in place with a hand adjustable wood working clamp with rubber non-slip surfaces. For application on 2 & 1/8 or 2 & 1/4 inch doors a single (or multiple) 1/8 inch spacer is used.

The first machined steel guide tube (1" X 4" X 14MM) is inserted and locked into position on the guide and an entrance hole of 10MM is drilled for a precise depth (controlled by a machined steel stop device on the electric drill itself). The machined steel guide tube is replaced with the 1" X 4" X 10MM version guaranteeing exact centering of the second hole which pierces the spacer between the two glass surfaces.

If front venting of the door is required, the field technician places the third machined steel guide tube (3/4" X 1 1/2" X 10MM) into the 3/4" Guide Tube Hole, this guarantees an access hole location exactly 90 degrees in relation to the access hole. A 10 MM drill bit is then used to make this secondary access hole.

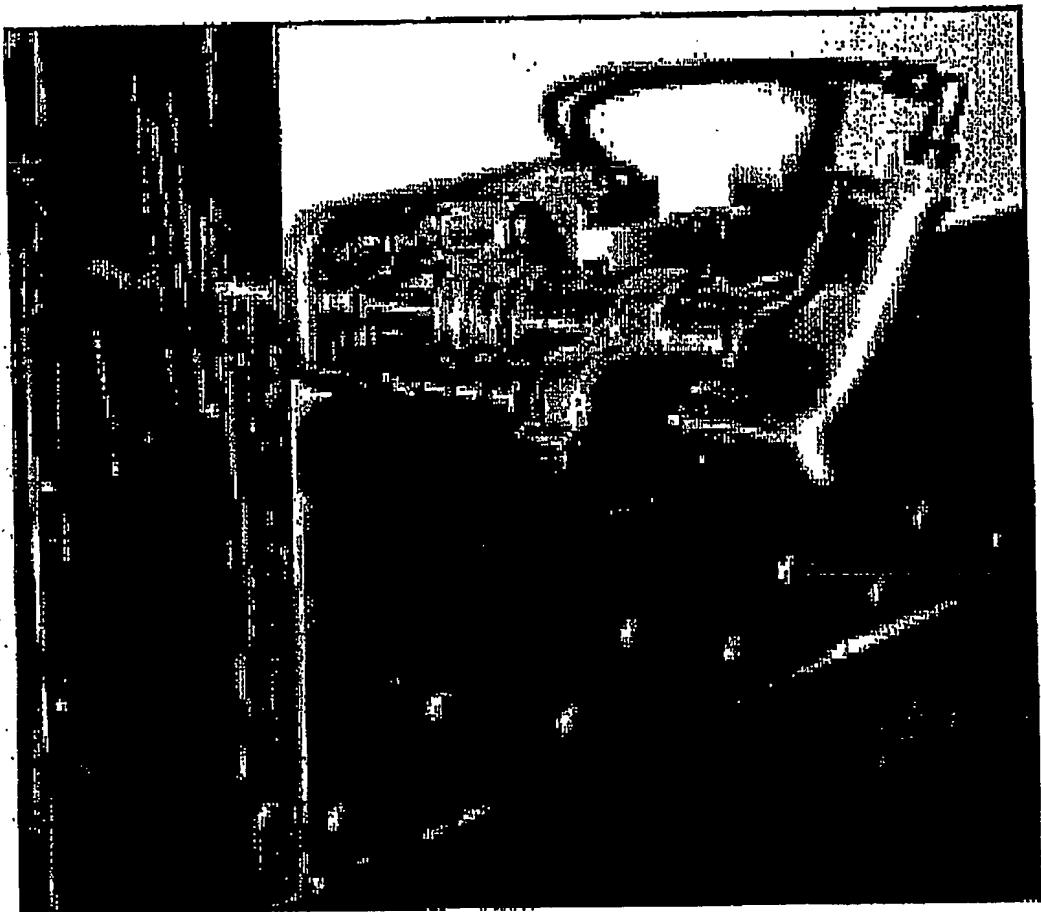


Figure 1

0081156 26-Sep-03 08:59

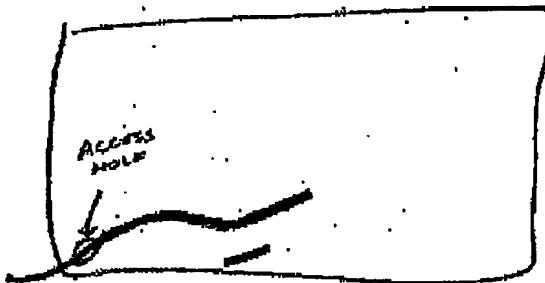
## INTRA- PANE SQUEEGEE

- 1) FLEXIBLE METALLIC CHAIN

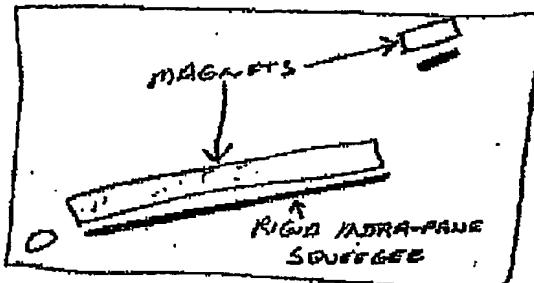
- ONLY FLEXIBLE WHEN NOT IN PRESENCE OF MAGNETIC FIELD

OR SHORT INFLEXIBLE METALLIC ROD

- 2) INSERTED INTO WINDOW CAVITY

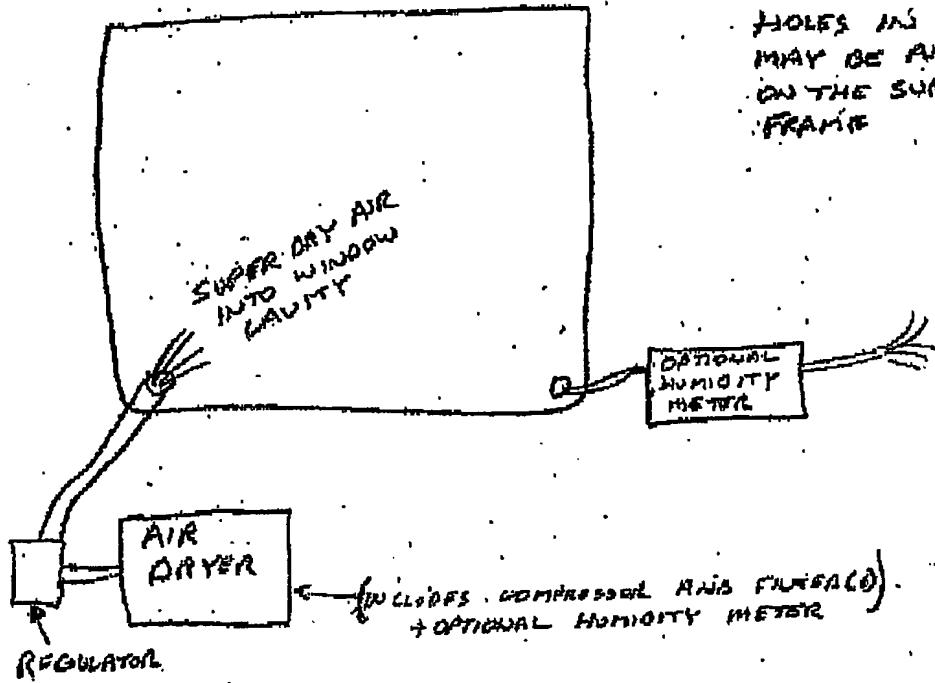


- 3) MAGNET APPLIED TO EXTERIOR SURFACE OF WINDOW MAKES SQUEEGEE RIGID, SQUEEGEE MANIPULATED WITHIN CAVITY BY MOVING MAGNET ON EXTERIOR OF WINDOW



Intra-Pane Squeegee 1

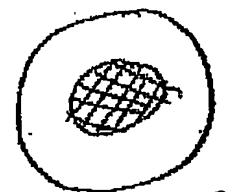
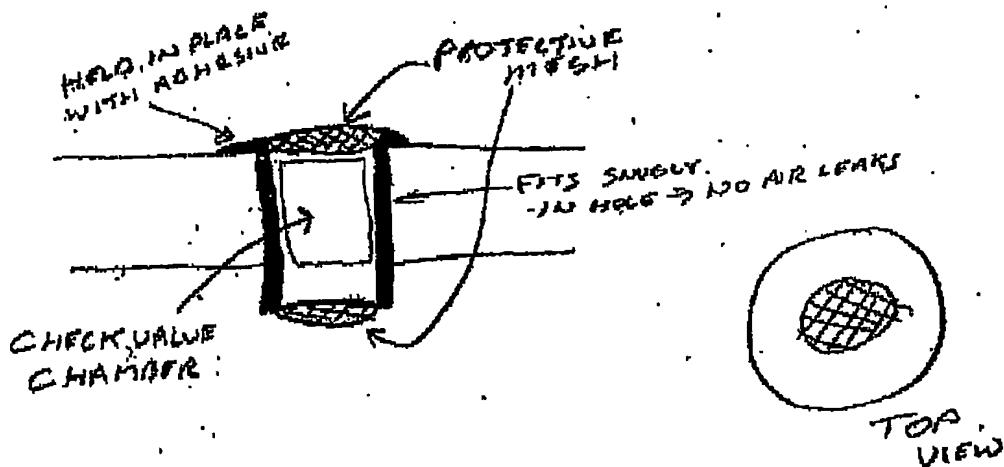
# WINDOW DRYER



HOLDS IN WINDOW  
MAY BE ANYWHERE  
ON THE SURFACE OR  
FRAME

Window Dryer 1

# ONE-WAY VALUE PLUG



TOP VIEW

CHECK VALUE CHAMBER MAY CONTAIN:



BUCKET VALVE

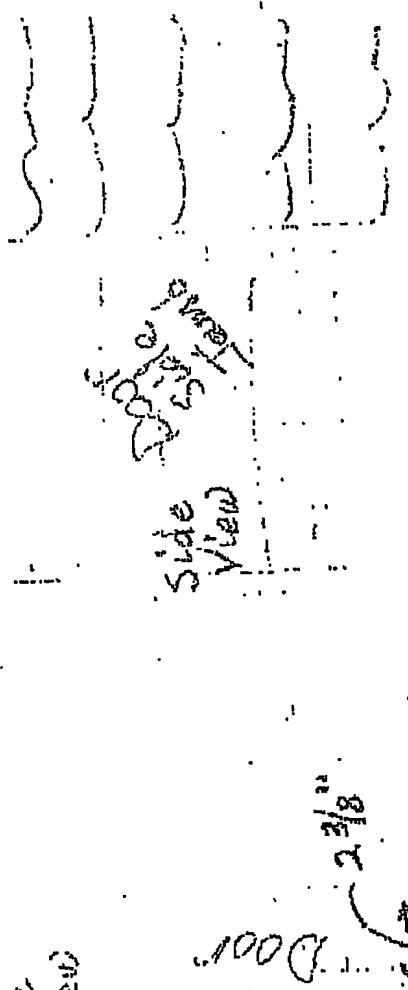


UMBRELLA VALVE

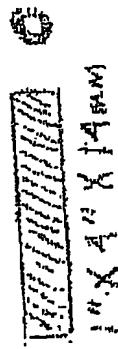
OR OTHER TYPE OF  
CHECK VALVE

One-Way Valve Assembly 1

Edge  
View



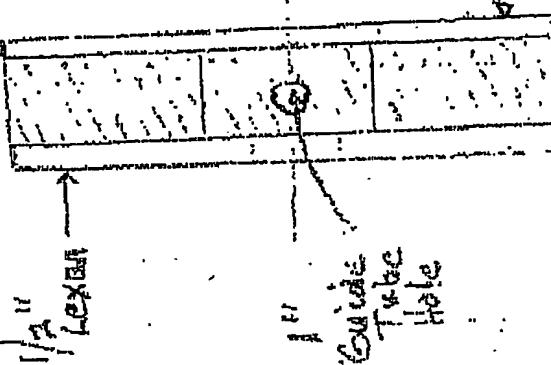
1" X 4" X 10mm



1" X 4" X 10mm

100

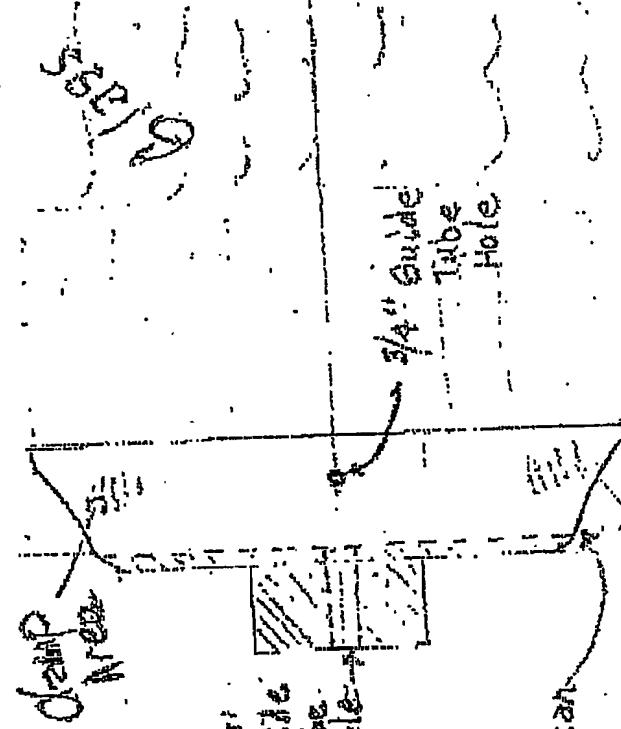
2 3/8"



100

2 3/8"

machined  
Al or  
phenolic



Guide Tubes

Precision Machined  
Steel Drill

3/4" Guide  
Tube  
Hole

1 1/2"  
Guide  
Tube  
Hole

Hex Nut

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